

Math 220 - Calculus f. Business and Management - Worksheet 30

Worksheet 30 - Optimization Word Problems

Exercise 1: A movie theater has a seating capacity of 525. With the ticket price set at \$10, average attendance at a movie has been 375 persons. Management has decided to lower admission prices to boost attendance. A market survey indicates that for each two dollars the price of a ticket is lowered, average attendance will increase by 100.

- a) Write a function, $q = Q(p)$ to express the the quantity q of tickets sold as a function of the price p .
- b) What is the range of possible values for the ticket price (consider that the theater can hold no more than 525 people)?
- c) Use $Q(p)$ to write the revenue function $r = R(p)$.
- d) To the nearest penny, what ticket price will result in maximum revenue? (Justify your answer)

Exercise 2: A manufacturer wants to minimize the cost of the container it is building to hold its products. The container is a rectangular prism (a box) with a square base. It must have a volume of 10ft^3 (cubic feet). The material that makes up the sides of the container costs \$0.12 per square foot. The material that makes up the top and bottom costs \$0.15 per square foot. What dimensions should the container have to minimize the cost of materials? How much will this optimal container cost?

Hint: Use the volume equation to replace the variable for the height of the box with the variable for the length of the sides of the box.

Exercise 3: A rectangular enclosure is to be built next to a river. There will be no fence on the river side of the enclosure. The cost for the material for the side parallel to the river is \$6.00 per foot. The material for the sides perpendicular to the river costs \$2.00 per foot. There is a budget of \$240.00 for the fence. What dimensions of the fence result in the largest enclosed area?